In conclusion I may be allowed to express my best thanks to M. Menier: without the magnificent crystals furnished by his ateliers, I could not have even attempted to clear up this question.

Though proud of her office as guide of industry, science acknowledges without blushing that there are territories on which she cannot advance without leaning on the strong arm of her powerful companion. Joint labours of this kind cannot fail to seal the pledge of alliance between industry and science.

II. "On some new Compounds obtained by Nitrogen-substitution, and new Alcohols derived therefrom." By PETER GRIESS, Esq. Communicated by Dr. HOFMANN. Received December 18, 1862.

In the beginning of this year (1862) I pointed out* that diazoamidobenzol, when submitted to the action of nitric acid containing nitrous acid in solution, is transformed into a new compound according to the equation

$$\underbrace{C_{12}H_{11}N_3}_{\text{Diazo-amidobenzol.}} + 2\,HNO_2 + HNO_3 = \underbrace{2\,(C_6H_4N_2,\,HNO_3)}_{\text{New compound.}} + 2H_2O.$$

I have now found that this remarkable compound, the nitrate of diazobenzol, can be much more easily produced by the action of nitrous acid upon nitrate of aniline,

$$\underbrace{C_6H_7N,\,HNO_3}_{\text{Nitrate of aniline.}} + HNO_2 = \underbrace{C_6H_4N_2,\,HNO_3}_{\text{Nitrate of diazobenzol.}} + 2H_2O.$$

This process has furnished me a considerable number of similarly conconstituted nitrogen-substituted derivatives, not only of monacid monamines, but also of diamines; and it is to some of the bodies generated by means of the latter that I beg leave to call the attention of the Royal Society.

If a current of nitrous acid be passed into a cold solution of the nitrate of benzidine, a base which, by the researches of P. W. Hofmann, has been characterized as a well-defined diacid diamine, a new compound is produced, crystallizing from water in white needles,

* Ann. Chem. Pharm.

explosive like fulminate of mercury, the composition of which was established by the analysis of a platinum-salt containing

$$C_{12}H_6N_4,\ 2HCl,\ 2PtCl_2.$$

The formation of this new substance is illustrated by the following equation :—

$$\underbrace{C_{12}H_{12}N_2+2HNO_3}_{\text{Nitrate of benzidine.}}+2HNO_2=\underbrace{C_{12}H_6N_4,\ 2HNO_3}_{\text{New compound.}}+4H_2O.$$

Of subordinate interest themselves, these substances deserve to be noticed on account of the numerous and often peculiar bodies arising from their decomposition. Thus the tetrazo-compound just described, when boiled with water, splits according to the equation

$$\underbrace{C_{12}H_6N_4,\ 2HNO_3}_{\text{Nitrate of tetrazo-compound.}}+2H_2O=\underbrace{C_{12}H_{10}O_2}_{\text{New substance.}}+N_4+2HNO_3.$$

The new non-nitrogenous substance thus obtained crystallizes in small sublimable plates. Both formula and properties characterize it as a compound standing, like phenol, upon the boundary line between acids and alcohols: it furnishes a very extensive series of derivatives, which may be generally represented by the formula

$$2\text{Phenyl-body}-2H=\text{new compound.}$$

Here I will only mention the chloride corresponding to the new alcohol (acid). It crystallizes in white volatile plates, which may be readily prepared by heating the above-mentioned platinum-salt with carbonate of sodium. The reaction takes place at 100°.

$$C_{12}H_6N_4,\ 2HCl,\ 2PtCl_2=C_{12}H_8Cl_2+2PtCl_2+4N.$$

In conclusion, I may be allowed to state that nitrate of naphthylamin likewise yields an azo-compound. This compound,

$$C_{10}H_6N_2HNO_3$$

when submitted to the action of boiling water, undergoes a transformation analogous to that of nitrate of diazobenzol,

$$\underbrace{C_6H_4N_2HNO_3}_{\text{Nitrate of diazobenzol.}}+H_2O=\underbrace{C_6H_6O}_{\text{Phenol.}}+2N+HNO_3,$$

$$\underbrace{C_{10}H_6N_2HNO_3}_{\text{Nitrate of diazonaphthol.}}+H_2O=\underbrace{C_{10}H_8O}_{\text{New compound.}}+2N+HNO_3.$$

I have not yet analysed this new compound; but both mode of formation and properties (it crystallizes in white very fusible needles, possessing the odour of creosote) leave no doubt that it is the alcohol of the naphthaline series which has so long eluded the researches of chemists.

III. "On the Differential Equations of Dynamics. A sequel to a Paper on Simultaneous Differential Equations." By GEORGE BOOLE, F.R.S., Professor of Mathematics in Queen's College, Cork. Received December 22, 1862.

(Abstract.)

Jacobi in a posthumous memoir*, which has only this year appeared, has developed two remarkable methods (agreeing in their general character, but differing in details) of solving non-linear partial differential equations of the first order, and has applied them in connexion with that theory of the differential equations of dynamics which was established by Sir W. R. Hamilton in the 'Philosophical Transactions' for 1834–35. The knowledge, indeed, that the solution of the equation of a dynamical problem is involved in the discovery of a single central function, defined by a single partial differential equation of the first order, does not appear to have been hitherto (perhaps it will never be) very fruitful in practical results. But in the order of those speculative truths which enable us to perceive unity where it was unperceived before, its place is a high and enduring one.

Given a system of dynamical equations, it is possible, as Jacobi had shown, to construct a partial differential equation such that from any complete primitive of that equation, *i. e.* from any solution of it involving a number of constants equal to the number of the independent variables, all the integrals of the dynamical equation can be deduced by processes of differentiation. Hitherto, however, the discovery of the complete primitive of a partial differential equation has been supposed to require a previous knowledge of the integrals of a certain auxiliary system of ordinary differential equations; and

* Nova methodus æquationes differentiales partiales primi ordinis inter numerum variabilium quemcunque propositas integrandi. (Crelle's Journal, vol. lx. p. 1.)